

PROCEEDINGS OF THE PRE-BID CONFERENCE FOR THE PROCUREMENT OF SOLUTIONIZING FURNACE

DATE & TIME : 11-01-2012 @ 11:30am

VENUE : C-CADD Conference Hall

The Pre-bid Conference was held and the following TPC members attended the meeting:-

- |                                |                      |
|--------------------------------|----------------------|
| 1. Mr. Yogesh Kumar            | .. Chairman          |
| 2. Mr. Kamaleshaiah            | .. Invitee           |
| 3. Mr. S. Ravishankar          | .. Project Leader    |
| 4. Mr. C. Chandrashekar        | .. Member            |
| 5. Mr. H. G. Jayarama Reddy    | .. Member            |
| 6. Mr. M. S. Pradeep           | .. Indentor          |
| 7. Mr. N. Ramamurthy, SO (F&A) | .. Member            |
| 8. Mr. V. R. Patil, SPO        | .. Member - Convenor |


The list of Prospective Bidders who attended the meeting as per Annexure-I.

At the outset, the Chairman welcomed all the Members and the representatives of the Prospective Bidders and briefed in general the scope of the Project and thereafter requested SPO to brief the vendors on the salient features of the Commercial terms and the Indenting Officer to read out the clarification sought by the Prospective Bidders and the replied thereto as detailed in Annexure-II.

The representatives present were satisfied with the replies given and it was informed that the corrections / additions / clarifications give, as discussed during the Pre-Bid Conference would be hosted on the website of NAL and all the Prospective Bidders are required to take cognizance of the proceedings of the Pre-Bid Conference before submitting their bids as stipulated in Clause 1.42 of the Bidding Documents.

The meeting ended with a vote of thanks to the Chair.


Encl: as above

  
Mr. M. S. Kamaleshaiah  
Member

  
S. Ravishankar  
Member

  
C. Chandrashekar  
Member

  
H. G. Jayarama Reddy  
Member

  
M. S. Pradeep  
Indentor

  
Mr. N. Ramamurthy  
SO (F&A)

  
V. R. Patil  
SPO

  
Yogesh Kumar  
Chairman





FILE NO.:CAD/Pur/2K11/089

ATTENDANCE SHEET

ANNEXURE - I

DATE & TIME : 11-01-2012 @ 11:30am  
VENUE : C-CADD Conference Hall

The following representative of Prospective Bidders attended Pre-bid Conference for the procurement of Solutionizing Furnace

Sr. No.	Name of the Firm	Name & Designation of the representative	Signature
1.	Associated Industrial Furnaces Ltd: KALASATA	P. VALSAR RE.	
2.	Therwell Engineering Pvt Bangalore.	Shankarabanda Somenkumarappa I.C.	
3.	Walmech Equip Co (P) Ltd Bangalore	S. Balasubramanian Technical Advisor	
4.	Associated Industrial Furnaces	S. Chandhan Sr Mgr - M&E	
5.			
6.			
7.			

Pre-Bid Proceedings

Annexure-II

Contents

PART	Content	Pages
A	Amendment to technical specifications of Chapter -04	2
B	Makes of electrical and mechanical items	1
C	Heat treatment process for aluminium alloys- (NAL/NAP/17 )	2
D	Heat treatment process for Ferrous alloys- (NAL/NAP/028 )	2
E	Reply to Queries raised by M/s. Welmach Engineers , Bangalore	1
F	Reply to Queries raised by M/s. Associated Industrial Furnace (P)Ltd., Kolkata	1
G	Plant Layout for Hydraulic Press & Solutionising Furnance	1

**NOTE:**

The due date for submission of the tender is extended to 22-02-2012 (upto 1630 hrs-IST).

## PART-A:

### Amendment to technical specifications of Chapter -04

With reference to the Pre-Bid meeting held on 11/01/2012 at 10.30 am on the above subject, the following technical specifications of Chapter -04 of the tender document are amended as listed below.

The amendment is applicable for both Option I and Option II.

Sl. No.	Description	Specification	Amended Specification
2.7	Working Temperature	0° - 600° C (continuously variable with programmable control)	250°C – 600°C (continuously variable with programmable control)
2.12	Temperature Control System	Automatic through Micro Processor based PID Controller with thyristor power pack	Automatic through Micro Processor based PID type programmable Controller with thyristor power pack with PLC , MMI and SCADA system to program ,modify operating heat cycles, cooling cycles , log all activities during operation like trends, faults and cycle start and completion time. All the data can be printed or can be stored for a fixed period of time.
2.13	Temperature Recorder	Multi Point Paperless recorder along with paper reading.	PLC, MMI and SCADA system to program, modify operating heat cycles, cooling cycles, log all activities during operation like trends, faults and cycle start and completion time. All the data can be printed or can be stored for a fixed period of time.
2.20	Cooling Rate	Additional Clause	28°C/hr
2.21	Delivery period	Additional Clause	6-8 months from the date of Purchase order
2.22	Make of Electrical/ Mechanical items	Additional Clause	List as per Annexure -IV
2.23	Plant Layout	Additional Clause	Annexure –V
2.24	Heat treatment process for aluminium alloys	Additional Clause	As per NAL/NAP/17 (relevant details enclosed )
2.25	Heat Treatment of ferrous alloys	Additional Clause	As per NAL/NAP/028 (relevant details enclosed )

#### Special Notes:

1. The maximum net loading (charge weight) in both the options will be 75 Kg per batch.
2. The heat recovery time specified shall be 20 Minutes.
3. Material Specification, process details and post solutionizing heat treatment parameters are as per NAP 017 for Aluminium alloys and applicable portion of NAP 028 within the limitations of this temperature range. (Relevant details of NAL/NAP/17 and NAL/NAP/028 are enclosed )
4. The smallest part size will be 20mmX20mmx 2.5 mm Thick aluminium part( hung from the basket) . Basket mesh size to be decided accordingly by the vendor.
5. Available Space for the furnace is 5m (L) x8m (W) x5m (H) above floor level.
6. Civil work for construction of the pit for the drop down furnace will be carried out by NAL for loading/unloading of charge located on a trolley in a pit. The railing and supporting brackets/fixtures are to be supplied by the vendor during pit construction. The pit layout drawings are to be given by the vendor at the time of placing the purchase order.

Sl. No.	Description / Specification	Amended Specification
<b>1.0</b>	<b>CASING</b>	
1.3	The inner wall shall be fabricated out of thick stainless steel sheet. Vendor to specify the thickness.	Clause deleted (Inner wall not required)
<b>3.0</b>	<b>FURNACE LINING</b>	
3.1	The space between outer casing & inner casing shall be filled with ceramic fibre modules of 1260° C range all around the furnace including bottom and door. Vendor to specify the thickness. The temperature on the outer surface of the furnace wall (exposed to ambient shop environment) shall not exceed 70 degree Celsius when the furnace is working at its maximum operating temperature.	The insulation between the outer casing and the heating element shall be made of ceramic fibre module of a minimum thickness of 250 mm with fiber module of density 160 kg/m³. The temperature on the outer surface of the furnace wall (exposed to ambient shop environment) shall not exceed 70 degree Celsius when the furnace is working at its maximum operating temperature.
<b>6.0</b>	<b>UNLOADING SYSTEM</b>	<b>LOADING/UNLOADING SYSTEM</b>
6.4	The S.S. charge basket with parts shall be transferred from the bottom opening of the furnace into Quenchant tank situated below the furnace meeting the quench delay requirements as per Sl. No. 2.19.	The S.S. charge basket with parts shall be transferred from the bottom opening of the furnace into Quenchant tank situated below the furnace meeting the quench delay requirements as per Sl. No. 2.19. This operational procedure shall be fully automated with necessary interlock.
6.5	Overhead crane provision for loading /unloading of basket from the tank to be provided. Suitable locator on the basket to be provided for auto run of these operations.	<b>This clause is deleted as it is addressed in Clause 6.3 .</b>
<b>8.10</b>	<b>Quenching Media (Additional Clause)</b>	<b>The quenching media will be Demineralised water only.</b>
9.1	The temperature control shall be through appropriate microprocessor based auto tuning PID temperature controller backed with Thyristor.	The temperature control shall be Automatic through Micro Processor based PID type programmable Controller with thyristor power pack with PLC , MMI and SCADA system to program ,modify operating heat cycles, cooling cycles , log all activities during operation like trends, faults and cycle start and completion time. All the data can be printed or can be stored for a fixed period of time.
9.4	Temperature recording shall be through a multi point, paper and paperless recording system with computer connectivity and supporting software of Eurotherm /equivalent reputed make. The resolution of the temperature plot shall be better than or equal to 6° C/mm ( transverse direction) and the chart speed minimum 25mm/hour with a provision to print the date and time. These features shall be programmable by the user.	Temperature recording shall be through a multi point, paperless recording system with computer connectivity and supporting software of <b>Eurotherm /Honeywell</b> make. These features shall be programmable by the user.
10.5	Computer controlled parameter setting with associated software. The software shall be user friendly, permit the operator to pre-set/ pre program heat treatment parameters like soaking time, ramp time, furnace temperature, and have provision for entry of other comments/ operational details. The software shall also store all the heat treatment parameters during the operation of furnace, and have post processing capability to generate user defined plots. Vendor to provide details. Vendor shall supply dedicated PC with software to meet these requirements, and a user manual for use of the software.	Computer controlled parameter setting with associated software. The software shall be user friendly, permit the operator to pre-set/ pre program heat treatment parameters like soaking time, ramp time, cooling rate, furnace temperature, and have provision for entry of other comments/ operational details. The software shall also store all the heat treatment parameters during the operation of furnace, and have post processing capability to generate user defined plots. Vendor shall supply dedicated Personal Computer (PC) with SCADA software to meet these requirements, and a user manual for use of the software. The controller shall be capable of storing preprogrammable/preprogrammed cycles of minimum twenty programs.
<b>13.0</b>	<b>TRAINING</b>	
13.1	Minimum 10 days of training to be provided for NAL Engineers on operation and maintenance of the furnace after installation and commissioning of the furnace at NAL	Minimum 10 days of training to be provided for NAL Engineers on operation and maintenance of the furnace after installation and commissioning of the furnace at NAL including operational training on usage of MMI and SCADA application software .

**PART-B:**

**MAKES OF ELECTRICAL AND MECHANICAL ITEMS**

Sl. No.	Description	Make
01	Pneumatic Cylinders	Festo/ SMC
02	Hydraulic power pack/cylinders /pump	Rexroth/ Yuken/ Vickers
03	Valves	Rexroth/ Yuken/ Polyhydron
04	Fibre Modules	Murugappa Morgan(MMTCL) / Unifrax
05	Heating element strip ( Ni/Cr 80/20)	Sandvik / Kanthal/ Rescal
06	Motors/	ABB/ Seimens/Bharath Bijlee
07	Geared motors/ Gear Box	Radicon / Bonfiglioli / Shanti / Crompton Greaves
08	MCB/MPCB/Power Contactors/	Siemens/ Schenider/L&T
09	Thyristor Pack	Eurotherm/AEG
10	Push Buttons/ Switches/ indication lamps	Siemens/ Technic / L&T/Schneider
11	PLC/SCADA (Supervisory Control And Data Acquisition)	Seimens/ Allen Bradley/GE Fanuc
12	Cables/Wires(copper)	LAPP/ Finolex/ Polycab
13	DC Power source	Seimens
14	Annunciation window ( Display Unit)	Dynatek/ Minilec
15	P C with 4 GB Ram (MMI) of latest configuration	HP/Dell with 19" TFT Monitor
16	Printer(Laser A3 Size)	HP
17	U P S	APC
18	Conduits	Pilica tubes / Connect well
19	Control cubicle	Rittal
20	Main controller /Safety controller/Paper less Recorder /Temperature Recorder	Eurotherm /Honeywell
21	Thermocouples	Toshniwal/ Tempsen
22	Insulation	MMTCL/Unifrax



## PART-C:

### HEAT TREATMENT PROCESS FOR ALUMINIUM ALOYS- (NAL/NAP/17)

**TABLE –I : SOAKING TIME FOR SOLUTION HEAT TREATMENT OF ALL WROUGHT PRODUCTS IN AIR CIRCULATING FURNACE**

FORM	THICKNESS (mm)		TIME (Minutes)	
	OVER	UP TO	MIN.	MAX.*
SHEETS, TUBES AND PLATES	-	1.6	20	25
	1.6	3.0	30	40
	3.0	6.0	50	60
TUBES & PLATES	6.0		Same as for sheets up to 6.0mm, plus 15 minutes for each additional 6mm or part thereof.	

\* Max soaking time shall not exceed the said temperature for clad materials.

**TABLE – II : PERMISSIBLE QUENCH DELAY**

PART THICKNESS (mm)	MAX. QUENCH DELAY ( seconds)
Up to 0.60	5
0.61 – 0.80	7
0.81 – 6.00	10
Greater than 6.00 mm	15

**TABLE III : EXTENDED COLD STORAGE TIME**

Storage Temperature ( °C )	Maximum permissible storage duration
0	4 Hours
-7	1 Day
-12	2 Days
-15	4 Days
-18	7 Days
-21	10 Days
-23	30 Days

**TABLE - IV**  
**HEAT TREATMENT PARAMETERS FOR WROUGHT ALUMINIUM ALLOYS**

Material Specification	Annealing		Solution Treatment		Precipitation Treatment		Final Condition
	Temp °C	Soaking and Cooling method	Temp. °C	Time	Temp °C	Soaking Period & cooling	
2024-T3 SHEETS QQA-250/4E OR QQA-355C	410 ±8	1 Hr Furnace Cool * plus 15 mts. for each additional 6mm or part thereof	495 ±5	Ref. Table-I For soaking time.	Room temp	4 days	T42
2024 T351 Plate QQA-250/4E	410 ±8	1 Hr Furnace Cool * plus 15 mts. for each additional 6mm or part thereof	495 ±5		Room temp	4 days	T42
2014-T6 L165T6/ L73 SHEET	410 ±8	1 Hr Furnace Cool*	505 ±5	Use water as quench media	175 ±8	Air Cool 9-12 hrs.	T 62
2014-T651 L168-T7511 BARS EXTRUSION	410 ±8	1 Hr Furnace Cool*	505 ±5		175 ±8	Air Cool 9-12 hrs.	T62
6082-T6 BSL 113 SHEET/ TUBES	410 ±8	1 Hr Furnace Cool * plus 15 mts. for each additional 6mm or part thereof	530 ±5		175 ±8	Air Cool 9-12 hrs.	T62
6061-T6 SHEET PLATES	350 ±8 Full or recovery anneal	1 Hr Furnace Cool * plus 15 mts. for each additional 6mm or part thereof	530 ±5		175 ±8	Air Cool 9-12 hrs.	T62

\* 28°C / Hour Maximum upto 250 °C

In case recovery annealing/stress relieving is required, the following notes can be referred.

1) The annealing temperature shall be 350-370°C, for a period of 30-60 minutes.

2) For sheets and tubes, over 6mm thickness, the annealing temperature shall be 350-370°C for a period of 30-60 minutes plus 15mts, for each additional 6mm or part thereof



**PART-C:**

**HEAT TREATMENT OF FERROUS ALLOYS : NAL/NAP/028)**

**Appendix 028-01**  
(page 1 of 2)

**HEAT TREATMENT PROCESS PARAMETERS**

Designation/ Specification	Anneal (°C)	Normalise (°C)	Harden (°C)	Temper (°C)	
				UTS in Kg/mm <sup>2</sup>	Temper (°C)
Cr Mo Steel sheet AMS 6350 MIL-S-18729 4130 Cond A, N	845-870 Furnace Cool	870-930 Air Cool	845-885 Oil Quench	70.2 (Min)	675 Air Cool
				88.4-98.3	565 Air Cool
				98.3-112.2	495 Air Cool
				112.2- 125.5	455 Air Cool
				125.5-140	385 Air Cool
				Over 140	370 Air Cool
MIL-S-6758 / SAE 4130 Cr. Mo. Steel Bar, Rod	845-870 Furnace Cool	870-925 Air Cool	845-885 Oil Quench/ water quench	85 (min)	550 Air cool
MIL-T-6736 B Cr. Mo. Steel Tube	845-870 Furnace Cool (Below 495).	870-925 Air Cool	845-885 Oil Quench	88 (Max)	565 Water Quench
				88-105.4	495 Water Quench
				105.4- 126.5	385 Water Quench
AISI 4340 AMS 6359	790 - 840	870	600°C, hold for 30 minutes, raise to 820°C, hold for 20 min and oil quench	360°C, hold for 30 minutes, raise to 420°C±5°C, hold for 30 minutes and air cool	

Precipitation Heat Treatment(Air Cooled) parameters				
	Condition	Temperature in °C	Time in minutes	UTS Kg/mm <sup>2</sup>
AMS 5659H Corrosion Resistant Steel (Solution Heat Treated) (Bar Stock)	H 900	482 ±6 ✓	60 ±5 ✓	130 to 160
	H 925	496 ±6 ✓	240 ±15 ✓	125 to 156
	H 1025	552 ±6 ✓	240 ±15 ✓	110 to 140
	H 1075	579 ±6 ✓	240 ±15 ✓	105 to 127
	H 1100	593 ±6 ✓	240 ±15 ✓	100 to 125
	H 1150	621 ±6 ✓	240 ±15 ✓	95 to 120
AMS 5737 Corrosion Resistant Steel (Bar Stock)	1. <b>Solution Treatment:</b> Heat to 899 <sup>0</sup> C, hold at heat for a time commensurate with cross sectional thickness and quench in oil, water or other medium acceptable, except that product 0.25 inch (6.35mm) and under in nominal diameter or distance between parallel sides may be air cooled from the solution heat treating temperature.  2. <b>Precipitation heat treatment:</b> Heat to a temperature 704 <sup>0</sup> C to 760 <sup>0</sup> C, hold at heat for not less than 16 hours and cool in air.			98.4 (minimum)
AMS 5731 Corrosion resistant Steel (Bar stock)	1. <b>Solution Treatment:</b> Heat to 982 <sup>0</sup> C, hold at heat for a time commensurate with cross sectional thickness and quench in oil, water or other acceptable medium.  2. <b>Precipitation heat treatment:</b> Heat to a temperature 718 <sup>0</sup> C, hold at heat for not less than 16 hours and cool in air.			91.0 (minimum)

**PART-E:**

**Reply to Queries raised by M/s. Welmach Engineers , Bangalore**

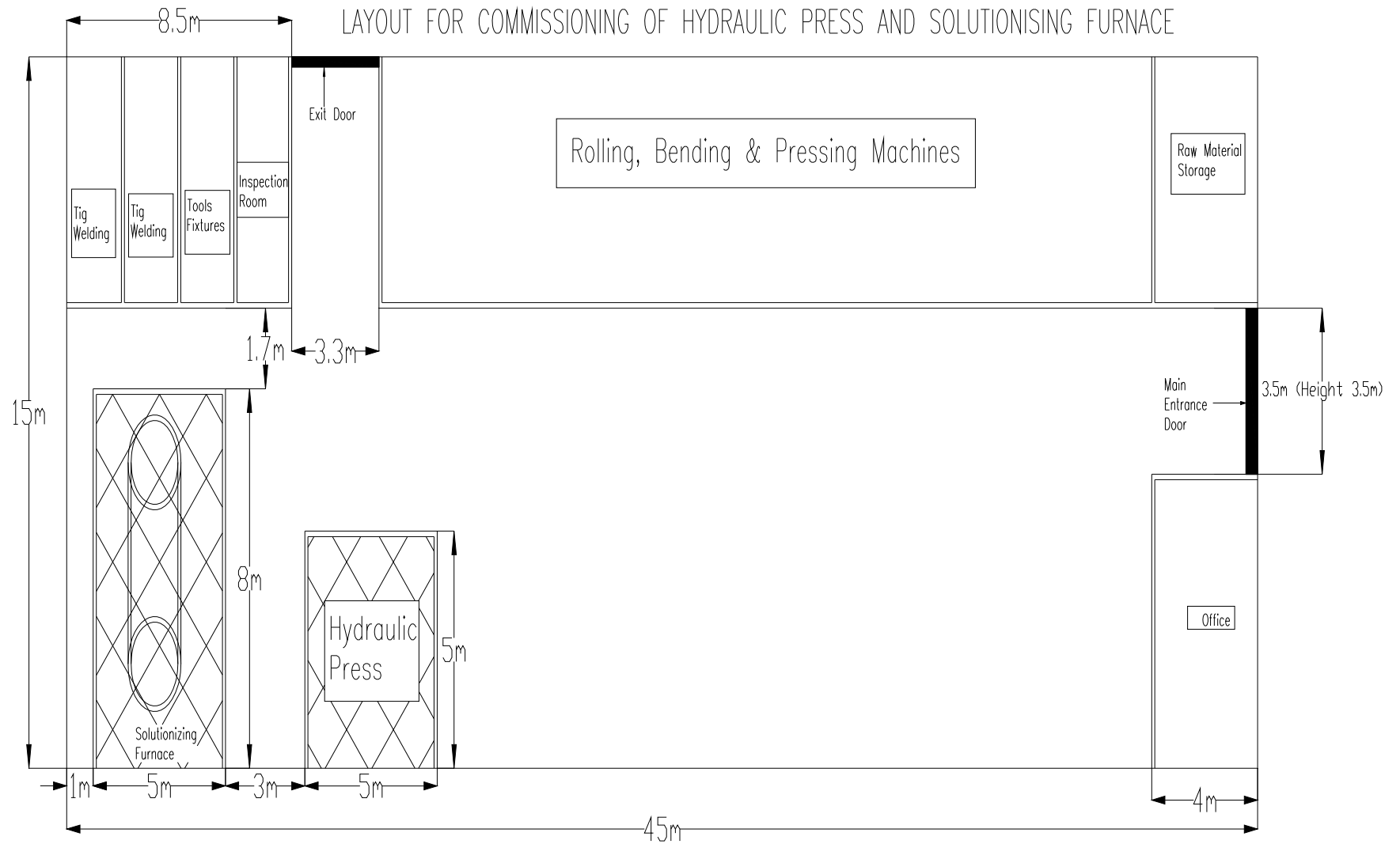
Sl. No.	Query	Reply
01.	Both for Option I and II please indicate the net loading per batch	Net part loading is 75kg excluding weight of the basket.
02.	As per the Technical specification given in the tender Document for Option I ,the test load is mentioned as sheet metal component of size 1500mm X 1300mm x2.5 mm Thickness and 4 Nos. to be loaded per batch. This will constitute approximately 50 kg load.	The trials for approval /testing involve evaluating components of various thickness ranges. The load per charge shall not exceed 75 kg . NAL/NAP/17 is enclosed for reference .
03.	In option II the same is mentioned as 2 M X1.2mX2.5mm thickness, 4 nos. sheets where the loading per batch will constitute approximately 75 kgs.	The trials for approval /testing involve evaluating components of various thickness ranges. The load per charge shall not exceed 75 kg. NAL/NAP/17 is enclosed for reference.
04.	For aerospace /aircraft components solution treatment normally a recovery time of 20 minutes is specified namely the furnace under temperature when loaded with the specified load, the furnace temperature should pick up in 20 minutes is this applicable in case as the KW rating for heating will depend on this data.	Yes. Please refer NAL/NAP/17 which details the process , heat treatment Spec. for Aluminium alloys and applicable portion of NAL/NAP/ 028 (Within the limitation of this temperature range). Enclosed NAL/NAP/17 and NAL/NAP/ 028 specifications for reference.
05.	Agitation of the water by a propeller is required for uniform drop in temperature of the parts and to get the required as quenched hardness. This has not been specifically mentioned in the technical Specs. Should we consider this?	Not required.
06.	Under casing, inspection by third party for welding is specified . Does it include the complete furnace like the doors, inside baffle and other fabricated components or only to the outer shell? This will have an impact on the price and hence this clarification.	Third party weld inspection is required for casing only.
07.	To prove the acceptance of the equipment with load ,please provide the material alloy specification and the final heat treatment Spec. you are looking for so that the process could be clearly understood by us	Enclosed relevant sheets of NAL/NAP/17 and NAL/NAP/ 028 for reference.

**PART-F:**

**Reply to Queries raised by M/s. Associated Industrial Furnace (P) Ltd., Kolkata**

Sl. No.	Query	Reply
01.	Chapter 4 of the tender mentions that the furnace design is dependent of the allocated site .As desired by you we will visit your plant on the designated date, However we request you to provide a layout drawing enabling us to understand the site condition and design accordingly.	As per layout drawing enclosed. Potential vendors should visit the designated site before submission of quotation.
02.	Under furnace Specification Sr. No. 2.10 to 2.13 of the tender, maximum weight of products to be solutionised and time –temperature profile (heat up time, Soak time etc.) is not available to determine power rating of the furnace.	The relevant details of NAL/NAP/17 and NAL/NAP/028 are enclosed. Max. wt.: 75kg per charge excluding basket weight.
03.	Point No. 2.12 and 2.13 mentions PID programmable controller and paper less recorder for temperature control and recording of the furnace temperature. However, we propose to use PLC and HMI with SCADA system to program .modify operating heat cycles, log all activities during operation like trends, faults and cycle start and completion time. All the data can be printed or can be stored for a fixed period of time. The system offered will not comprise of separate PID for temperature control. However a digital ON /OFF controller will be provided for over temperature control.	Automatic through Micro Processor based PID type programmable Controller with thyristor power pack with PLC , MMI and SCADA system to program ,modify operating heat cycles, cooling cycles , log all activities during operation like trends, faults and cycle start and completion time. All the data can be printed or can be stored for a fixed period of time. A digital ON /OFF controller can be provided for over temperature control.
04.	Chapter 4 Section II construction details Point 1.3 of the tender mentions about inner wall made of Stainless Steel. However point 4.0 describes Nichrome strips supported on ceramic supports all around the furnace. Please note that with metallic inner wall it is not desirable to use strip type heating elements on wall. In which case, short circuit may lead to serious accidents. We will propose a different design which will be deviation from the proposed technical specification?	All safety precautions should be taken care to comply with 10.1.i, 10.1.j and 14.3. Further, the design should ensure that no short circuit occurs.
05.	Point 7 under section II Construction details, the tender specifies to supply three (3) Nos. SS basket made of SS grill/ mesh as per sizes provided in Point 2.1 under Scope of works. However to design and manufacture the basket and determine the grills / mesh, details like minimum dimension of component and maximum weight of single component.	Maximum weight of a charge is 75Kg excluding basket weight. Minimum dimension of the component is 20mmX20mmX 2.5mm Thick.
06.	The tender do not specify any preferred make for electrical and mechanical items.	List of Electrical and mechanical items is enclosed in Annexure –IV
07.	In view of the criticality of the furnace, we will quote in collaboration with our overseas partner. In order to complete the proposal engineering and propose correct solution for your requirement ,we would request you to extend the bid submission date from February 2,2012 to February 22,2012	The date for submission of the bid is extended to 22/02/2012.

**PART-G:**



NOTE: ALL DIMENSIONS IN METERS

SCALE: 1:1